

IN THE SPECIFICATION:

Please amend paragraph number [0005] as follows:

[0005] While processing semiconductor devices in such a manner is typically reliable, there are certain inefficiencies associated with such a method. For example, when using mechanical type cylinders, whether they be pneumatic, hydraulic or a solenoid, damage to the individual semiconductor devices is not only a possibility, it is at times a reality. The force of such actuators often mars or leaves marks on the surface of a device and may even cause functional or operational damage in certain instances. Also, in attempting to achieve greater efficiency, the cycle time of such mechanical devices may be ~~increased~~ increased, which results in greater likelihood of damage due to the rapid deployment and impact with the semiconductor IC device or component. Additionally, such actuators require careful positioning such that ~~contact,~~ contact and, thus, likely damage, is not made with conductive elements of the semiconductor device. Direct and abrupt contact with the conductive elements would likely result in damage thereto possibly rendering the device inoperable. For this reason, actuators are typically positioned to avoid contact with the conductive balls or bumps on a ball grid array (BGA) type device.

Please amend paragraph number [0007] as follows:

[0007] In light of the shortcomings of the art, it would be advantageous to provide an apparatus and method for handling and singulating semiconductor devices, or semiconductor device components, which may assist in improving cyclical time of such singulation. It would also be advantageous to provide an apparatus and method ~~which~~ that reduces or eliminates damage to the processed devices or components during singulation. Such an apparatus or method may advantageously be utilized in conjunction with various phases or aspects of semiconductor device production including both manufacturing and testing. Additionally, it would be advantageous to provide such an apparatus or method with the ability to contact conductive elements of the semiconductor devices without the risk of damage thereto.

Please amend paragraph number [0010] as follows:

[0010] In accordance with another aspect of the invention, an apparatus is provided for singulating semiconductor components, such as, for example, die or lead frames. The apparatus includes a flexible membrane ~~which~~ that is configured to receive an applied fluid pressure on a surface of the membrane such that it expands and contacts a semiconductor device moving adjacent to the membrane. The membrane serves to temporarily immobilize the semiconductor device component for a predetermined manufacturing or testing operation. As described above, the apparatus may be configured with multiple flexible membranes.

Please amend paragraph number [0021] as follows:

[0021] Referring to drawing FIGS. 1A through 1C, an apparatus 10 for singulating or controlling the movement of an integrated circuit (IC) device or semiconductor device 12 is shown. While the semiconductor device 12 is depicted as a ball grid array (BGA) type semiconductor device, the present invention is compatible with numerous types of semiconductor devices as well as semiconductor device components utilized to manufacture the resulting semiconductor device. The apparatus 10 includes a ~~body 14 which~~ body 14, which is shown in the form of a plate. A first opening 16 is formed in the body 14 and is communicative with a second opening 18 or cavity. The first opening 16 is configured to be coupled with a fluid pressure source such as, for example, a pneumatic or hydraulic supply. The first opening 16 thus may include threads or may be otherwise adapted for various fittings or connections to the fluid pressure source as are known to those of ordinary skill in the art. The second opening 18 has a flexible membrane 20 sealingly coupled thereto. Illustrated in drawing FIG. 1A is the flexible membrane 20 in a relaxed and disengaged position. The flexible membrane 20 remains in the disengaged position until a fluid pressure is supplied to the second opening or cavity 18 via the first opening 16. Upon introduction of a fluid pressure into the cavity 18, a pressure builds against the interior surface of the flexible membrane 20 until a sufficient amount of pressure causes the flexible membrane 20 to expand outwardly from the cavity 18 and towards the semiconductor device 12. Ultimately, the flexible membrane 20 contacts the semiconductor

device 12 as shown in drawing FIG. 1B and, upon application of sufficient fluid pressure, immobilizes the semiconductor device 12 by pressing it against an opposing surface 22 such as a track or pathway adjacent the apparatus 10.

Please amend paragraph number [0023] as follows:

[0023] The flexible membrane 20 shown in the above described embodiments, as well as those discussed below herein, may be formed of a latex material. Latex exhibits desirable properties of durability and a high degree of elasticity. However, other flexible materials such as various polymers and rubbers may be suitable for use in the presently described invention. Where the apparatus 10 may be utilized in areas of high temperature, such as, for example, in conjunction with burn-in testing of a semiconductor die ~~or an~~ or a semiconductor device, it may be desirable to form the flexible membrane 20 from a silicone based material in order to avoid premature deterioration of the membrane 20.

Please amend paragraph number [0024] as follows:

[0024] Referring to drawing Figs. 2A and 2B an alternative embodiment of the present invention is shown. An apparatus 30 is shown for singulating or controlling the movement of a semiconductor device (not shown). The apparatus 30 includes a first plate 32 having a first and second opening 34 and 36 therethrough. The openings 34 and 36 are configured to be coupled with a fluid pressure source and thus may be adapted to receive various fittings or couplings therein. A second plate 38 also includes a first and second opening 40 and 42 ~~therethrough~~ therethrough, which shall be referred to as apertures for sake of clarity. The apertures 40 and 42 are generally aligned with the openings 34 and 36, respectively. A first and a second flexible membrane 44 and 46 are sandwiched between the two plates 32 and 38 and a portion of each is exposed to the openings 34 and 36 as well as the apertures 40 and 42, respectively. It is noted that while the flexible membranes 44 and 46 are designated as individual components, they are actually shown to be formed of single sheet or film of material 48. Such designation of separate membranes 44 and 46 is used for convenience in describing the individual components, but also

indicates that separate and individual sheets or films of material could be placed between the two plates 32 and 38 so long as the material was oriented in a sealed manner between the openings 34 and 36 and the apertures 40 and 42 to properly form the membranes 44 and 46, respectively. Likewise, while both plates 32 and 38 are shown as unitary members, either may be formed of multiple components. For example, the second or bottom plate 38 may be formed of separate flange members, each having an opening therethrough, and each serving to seal the flexible membrane adjacent its respective opening.

Please amend paragraph number [0028] as follows:

[0028] Referring now to drawing Figs. 4A through 4C a portion of an automated handler 80 is shown wherein flexible membranes or bladders, similar to those described above, are employed. The handler 80 includes an input location 82, such as a hopper or magazine, for loading a plurality of semiconductor devices 84. The semiconductor devices 84 dispense serially onto an inclined track 86 ~~which~~ that feeds the semiconductor devices to a singulation device 88 such as by means of gravity. As the semiconductor devices 84 pass along the track 86 adjacent the singulation device 88, a flexible membrane or bladder 90, similar to that described above, is actuated such that it contacts and immobilizes the semiconductor ~~device 84~~ device 84' furthest down the track 86 as seen in drawing FIG. 4A. Immobilization of the semiconductor ~~device 84~~ device 84' adjacent the singulation device 88 also causes all of the upstream semiconductor devices to stop as well. A second flexible membrane or bladder 92 then engages the semiconductor ~~device 84~~ device 84'' directly adjacent and upstream from the first immobilized semiconductor ~~device 84~~ device 84' as shown in drawing FIG. 4B. Thereafter, the first flexible membrane 90 is disengaged allowing the first semiconductor ~~device 84~~ device 84' to advance while the remaining semiconductor devices 84 are held in place by the immobilization of the second semiconductor ~~device 84~~ device 84'' via the second flexible membrane 92. While stopped by the first flexible membrane 90, the first semiconductor ~~device 84~~ device 84' may be subjected to a testing or manufacturing process. Or alternatively, following the release of the first semiconductor ~~device 84~~ device 84', it may be stopped by a third flexible membrane (not

shown) at a predetermined distance down the track 86 to be subjected to a specified manufacturing or testing process. Subsequent the release of the first semiconductor ~~device 84~~, device 84', the second semiconductor ~~device 84~~— device 84'' may be released and advanced until it is contacted and immobilized by the first flexible membrane 90 and the cycle will continue.

Please amend paragraph number [0029] as follows:

[0029] Referring to drawing FIG. 5A, a singulating apparatus or device 100 is shown in conjunction with a testing device 102. The singulating device 100 employs a flexible membrane or bladder 104 to singulate a semiconductor device 106 as described above. The semiconductor device 106 is then subjected to a test or a series of tests conducted via the testing device 102. For example, the testing device 102 might include an apparatus ~~which~~ that engages with a plurality of conductive elements 108 through which the internal circuitry may be tested. Alternatively, the testing device 102 may include componentry used to test the integrity of soldered joints. Similarly, other various tests may be performed upon the semiconductor device 106 subsequent singulation as known and understood by those of ordinary skill in the art.

Please amend paragraph number [0030] as follows:

[0030] Referring to drawing FIG. 5B, the singulation apparatus 100 is shown to be used with a manufacturing or processing apparatus 110. The semiconductor device 106 is inverted as compared to that shown in drawing FIG. 5A and the flexible membrane 104 is shown to be contacting a plurality of the conductive elements 108 on the semiconductor device 106. With the semiconductor ~~device 104~~ device 106 oriented as shown in drawing FIG. 5B, a manufacturing process such as marking or demarking the semiconductor device 106 may be carried out. For example, the processing apparatus 110 may be a laser marking apparatus used to mark the semiconductor device 106 during singulation. Likewise, similar manufacturing steps may be carried out in a like manner. Also, multiple bladders may be strategically positioned to motivate or reposition a semiconductor device or component into a desired position.